

REVISION OF THE CICINDELIDÆ OF AUSTRALIA.

BY THOMAS G. SLOANE.

Plates xxv.-xxxi., from drawings by Arthur M. Lea and H. J. Hillier (Plate xxxi.).

This paper had its origin in an offer by Mr. A. M. Lea to prepare some illustrations of the Cicindelidæ of Australia if I would supply the letterpress. Students of the Cicindelidæ owe a debt of gratitude to Mr. Lea for applying to this family his skill and knowledge of anatomical draughtsmanship gained by long study and careful descriptive work in the order Coleoptera, more especially as his action was prompted solely by his enthusiasm as a coleopterist.

After considerable progress had been made with this Revision Dr. Walther Horn sent me his "Systematischer Index der Cicindeliden" (Berlin 1905), and invited me to correspond with him; he kindly read the first drafts of my species-tables, and offered some opinions thereon; it is therefore with much pleasure that I record my thanks to him for the assistance he has given, which has enabled me to make my work of fuller value and more modern tone than could otherwise have been the case. My thanks are also especially due to Mr. C. French, of Melbourne, for valuable assistance by the gift and loan of specimens, including the three new species recorded in this Revision.

TAXONOMY.

Darwin's views on classification should never be lost sight of by the systematist, and I would direct particular attention to the following, namely (1) the falsity of the idea that those parts of the structure which determined the habits of life, &c., of each animal would be of very high importance in classification; (2) the

importance of an aggregate of characters even of trifling value; (3) the invariable failure of classifications founded on any single character; (4) the quotation from Linnæus "that the characters do not give the genus, but the genus gives the characters."*

The Darwinian dictum that a classification founded on a single character has always failed, and the Linnean aphorism that the genus gives the characters not the characters the genus, form the true foundations of taxonomy, yet it is to be noticed that these basic principles are often utterly neglected by systematists in entomology. The following two hypotheses (not new) are also deserving of careful consideration. (1) Any character with a tendency to vary is likely to vary greatly, so that it may become exaggerated, rudimentary, or may be quite lost in different allied families, tribes, genera, or even in groups of species in large genera. (2) Characters once lost are extremely unlikely to be reacquired.

The first of these hypotheses will justify us sometimes in treating an organism which varies greatly from its nearest known allies in some particular character as possibly an exceptional case; *e.g.*, the absence of pubescence on the body generally in *Cicindela tetragramma* (and allied species) may not necessarily indicate descent from a stem in which such pubescence was wanting. The second hypothesis results from the belief that any character which becomes lost does so from such fundamental inherent tendencies of the organism that its reacquirement, at any rate in such a highly developed order as the Coleoptera, would imply an absence of continuity in the laws of development which seems at variance with the orderly trend of such laws

Till the year 1898 the classification of the Cicindelidæ adopted by Lacordaire in his "Genera" (1854) was that generally recognised; but in 1898 Dr. Walther Horn formulated a new and quite original system of classification. It will be useful to set out these two systems.

* Cf. 'Origin of Species' (6th ed. Lond. 1878) pp.365-367.

Then follow—vi. *Neomantichoridæ*, vii. *Paleomantichoridæ*, and viii. *Platychilidæ*, which are together equivalent to the MANTICHORIDES of Lacordaire, but are not represented in our fauna.

Lacordaire's classification is very artificial, the variations of the labial and maxillary palpi being quite inadequate for the purpose of differentiating tribes amongst the Geodephaga. All our Cicindelidæ belong to the *Cicindelidæ platysternaliæ* of Horn; and our only tribes, the Megacephalini and Cicindelini are the same in the systems of Lacordaire and Horn.

Note on the prothorax.—Dr. Horn divides the *Cicindelidæ platysternaliæ* into two chief divisions according as the prosternal sulcus is continuous with the apical pronotal sulcus or not. This division is a most excellent one, but Dr. Horn's way of expressing the difference between the Megacephalini and the Cicindelini, though terse and readily understood, and therefore eminently suitable for tabulation purposes, does not convey my idea of what really constitutes the divergent character between the prothorax of a *Megacephala* and that of a *Cicindela*. The difference in the continuity of the anterior sulci of the upper and lower sides of the prothorax is, in my conception of the matter, a secondary thing, resulting from the dissimilarity in the union of the pronotum and prosternum in front to inclose the proepisterna. If the underside of the prothorax of a Cicindelid be examined it will be noticed that the pronotum and the prosternum meet in front on each side and inclose the pro-episterna. In a species of the tribe Cicindelini the prosternum extends as far forward as the pronotum, so that the prothorax is truncate in front; and the pronotum and prosternum are so closely connected as to appear fused together, with hardly a trace of a suture. But in a species of *Megacephala* the pronotum projects forward beyond the prosternum; and, although these two pieces meet and inclose the pro-episterna in front, yet their point of contact is very small and their union in no way amounts to a fusion of the parts. No exception to the characteristic formation of these parts occurs in any Australian species of the tribes Megacephalini and Cicindelini.

Coxæ.—In the Cicindelidæ the anterior coxæ project strongly beyond the intercoxal piece of the prosternum, and have on their inner side a small tubercle which is received into a sinuosity of the coxal cavities (figs. 39, 40). In the Carabidæ the coxæ do not so project above the intercoxal part of the prosternum, and are without the tubercle of the inner side.

Tactile setæ.*—Among the Carabidæ and Cicindelidæ certain hairs are found which rise singly from pores in the chitinous skeleton. Considerable importance, for the purposes of classification, has been attributed to many of these setæ in the Carabidæ; but I have not met with any notice of their use in the Cicindelidæ.

In the Australian Cicindelidæ the following setæ at least have some taxonomic value—(1)The supraorbital setæ of the head (one seta above the eye in *Rhysopleura*, *Distypsidera*, and *Nickerlea*; two in *Megacephala* and *Cicindela*). (2)The juxta-antennal seta on each side of the clypeus (wanting in the genus *Cicindela* alone in our fauna). (3)The setæ of the labrum (*marginal* in *Rhysopleura*, *Distypsidera*, and *Nickerlea*; *submarginal* in *Megacephala* and *Cicindela*†). (4)The coxal tactile setæ (present *always* throughout the Australian Cicindelidæ on all the coxæ except in the genus *Megacephala* in which the *anterior coxæ are without setæ*). (5)The seta on each of the four anterior trochanters, which are wanting in the genus *Megacephala* alone in our fauna‡ (the posterior trochanters are always without setæ).

* These tactile setæ have nothing to do with the pubescence or bristles always to be found on some part of the body or coxæ throughout the genus *Cicindela*. For their use in the classification of the Carabidæ, cf. Horn, Trans. Amer. Ent. Soc. 1881, ix.; Sharp, Fauna Hawaiiensis, Col. Carab. iii. Pt. 3, p. 182 (1903); Sloane, these Proceedings, 1904, xxix, p. 106.

† The New Caledonian genus *Caledonica* has the large *Distypsidera*-like form of the labrum, but with only four setæ, the anterior pair of which are submarginal. This character, with the presence of two fully developed supraorbital setæ, seems to indicate that the phylogenetic position of *Caledonica* is between *Distypsidera* and the *Cicindela spuria*.

‡ I have noticed that in the Papuan *funerata*-group of the genus *Cicindela* none of the trochanters have a tactile seta.

I believe the presence or absence of these setæ to be constant in every species; therefore, they may be useful in helping to determine affinities. Often the seta is rubbed off, but then the puncture from which it rises may be seen by a careful examination. These setæ must have an important functional utility to the insect, but this is a subject on which I know nothing. The objection to the use of these tactile setæ in taxonomy is that too much stress may be laid upon the mere absence of one or more of them in a species. Negative evidence is always to be taken cautiously, as of less value than positive evidence; and it may be expected that any of these setæ may be lost in a species, all the congeners of which show such a seta; therefore, only when the absence of any tactile seta or setæ occurs throughout a group of species or a whole genus, and is supported by other characters of taxonomic value, can one feel confident that such loss of a seta or setæ is of more than merely negative importance. Occasionally, in species which have lost a seta, specimens may be found in which such seta is present; *e.g.*, a single specimen of *Megacephala crucigera* in my collection has the seta of the intermediate trochanters present, though in no other case have I found a *Megacephala* with a seta on any of the trochanters; this is evidently a case of atavistic reversion, and of interest as showing that the ancestral form from which *Megacephala* is descended had tactile setæ on the trochanters.

Some primitive characters.—Some characters may be noticed which, being found in the Megacephalini and Cicindelini, are evidently of ancient origin. Such are—(1)The pubescence of the outer side towards the apex of the intermediate tibiæ in the male; this is not found in the genus *Distypsidera*, nor in the *Cicindelæ spuria* of this paper. (2)Last ventral segment emarginate at apex in the male;* the notch is sometimes lost in the genus *Megacephala*. (3)A subsutural row of foveæ on the elytra.

* The old authors described the Cicindelidæ as having seven ventral segments in the male and six in the female. The modern view is that the so-called seventh segment of the male is only part of the genital armature.

(4)The humeral depression of the elytra; on each side of the base of the elytra, just behind the basal angles of the prothorax, there is usually a more or less developed longitudinal depression, often punctate; it is very deep in *Therates*. In our fauna the humeral depression varies considerably; in all the species of *Megacephala* with the basal part of the elytra unicolorous it is obsolete; but it is present in the species with the lateral margins brownish or testaceous (most feeble in *M. crucigera*); in *Distypsidera* it is strongly developed; it is present in *Rhysopleura*; in *Cicindela* it varies, being well developed in the *iosceles*- and *doddi*-groups which come nearest *Distypsidera*. It is probably a secondary sexual character originally pertaining to the female, correlative with the deeply concave mesepisterna in many species of *Cicindela*, and the protuberant posterior angles so strongly developed in *C. aurita*.

PHYLOGENY.

Dr. Walther Horn, in his "Index," has some notes on the phylogeny of the Cicindelidæ, from which I take the following interesting hypotheses—(1)The earliest Cicindelid-like form appeared in the Tropics of the Ethiopian region, branching from a Carabid-stem. (2)The Paleomantichorini, &c., followed by the Megacephalini, &c., leading on to the Cicindelini (geologically the most recent Cicindelid-form) may be taken as the general line of descent.

Dr. Horn believes that the original Cicindelid-forms were wingless, but there appear to be such strong objections to this idea that I cannot follow him on this point. I do not propose to elaborate arguments against the descent of strong-flying species from wingless ancestors amongst the Coleoptera; but I believe it will be impossible for anyone to accept the conclusion that the earliest Cicindelid-forms were wingless, who holds with me the following opinions—(1)That the Coleoptera are descended from insects with four free wings. (2)That the earliest Coleoptera were winged. (3)That the loss of the underwings indicates a degradational form among the Coleoptera. And(4)that characters

once lost are extremely unlikely to be re-acquired in such a highly specialised order as the Coleoptera.

It has been impossible for me to formulate any theories on the phylogeny of our Megacephalini, therefore only the tribe Cicindelini is here dealt with. Taking the genera, I believe the order to be *Rhysopleura*, *Distypsidera*, *Nickerlea*, *Cicindela*. In his "Index" (p.39) Dr. Horn gives his views on the phylogeny of the species of the genus *Cicindela* which are found in the Australian region as a whole. These he divides into four branches, all of which occur in Australia. (1) With two Australian groups (viz., the *tetragramma*- and the *ypsilon*-groups) descended from the "*longipes-biramosa-limosu*"-stem. (2) The *sætigera*-group of Antarctic origin. (3) The *mastersi*- and *semicincta*-groups, forming part of the great Papuan "*funerata*-group," and (4) The "*nigrina-iosceles*"-group descended from a *Euryoda*-stem. It is evident that Dr. Horn considered the *C. nigrina* and *C. iosceles* types as our most ancient forms. But *C. sloanei* Lea, *C. tenuicollis* Macl., and *C. oblongicollis* Macl., were unknown to him in nature, so that they are placed by him without exact knowledge; therefore their positions in his system of groups must be somewhat in the nature of a guess.

For me *C. sloanei** is our oldest *Cicindela*, followed in order by the *crassicornis-iosceles*-, *doddi*-, and *tenuicollis*-groups, which seem to me more inter-related amongst themselves than any of them is to the next succeeding group, viz., the *nigrina*-group. I am not prepared to offer any views on the lines of descent or relationships between the *tetragramma*-, *ypsilon*-, *igneicollis*-, and *semicincta*-groups, beyond indicating that in my opinion *C. frenchi* is, perhaps, not very closely allied to the other species of the *ypsilon*-group, and that *C. rafflesia* is probably the oldest Australian species of this group.

* I have referred *C. sloanei* Lea, to the genus *Nickerlea* on account of its glabrous undersurface and the form of the mentum and labial palps, but I do not think it can be at all closely allied to *N. distypsideroides* Horn, the type species of that genus.

The only Australian Cicindelid larva which I have seen is that of *Megacephala australis* Chaud.; this corresponds thoroughly with the general description given by Leconte.*

The two tribes found in Australia may be differentiated thus:—

Prothorax with pronotum projecting forward beyond prosternum at sides.

Prosternal sulcus not continuous with apical pronotal sulcus. Scutellum on peduncle, hidden by prothorax, not dividing elytra at base.....
.....MEGACEPHALINI.

Prothorax truncate at apex.

Prosternal sulcus continuous with the apical pronotal sulcus. Scutellum large, not hidden by prothorax, dividing elytra at base... CICINDELINI.

Tribe **Megacephalini.**

Genus MEGACEPHALA.

I follow Horn in placing all the Australian species of Megacephalini in one genus; but I have not tried to arrive at reasons why former writers called one species a Megacephala and another a Tetracha; nor why M. Fleutiaux saw such decided differences in *M. cylindrica* Macl., that he suggested a distinct genus, *Pseudotetracha*, for it. M. Fleutiaux seems to have missed the most decided character isolating *M. cylindrica* and *M. frenchi* Sl., namely, the short basal stalk of the labial palpi (see figs. 11 and 12). In any case *M. spenceri* Sl., and *M. greyana* Sl., together with *M. howitti* Cast., seem to greatly reduce the value of the differences sought to be established in the tables given in his "Troisième Note sur les Megacephalidæ d'Australie"† In *M. spenceri* the posterior femora do not reach the apex of the abdomen; in *M. greyana* these femora do not extend beyond the apex of the abdomen in the female, but do so slightly in the male; in *M. howitti* (♀) they extend beyond the apex of the abdomen; these species are all wingless, and to my mind congeneric.

* Classification of the Coleoptera of North America, p. 4 (Washington, 1883).

† Revue d'Entomologie, 1899, p. 46.

There are some variable minor characters of merely specific value which seem worth attention and study in the genus *Megacephala*, but for this work my material is insufficient. Such are—(1)The teeth of the mandibles. (2)The underwings present, or not. I regard the underwings as present in the described Australian species except *M. cylindrica*, *M. frenchi*, *M. spenceri*, *M. greyana*, and *M. cylindrica*, but their absolute absence in these species requires confirmation; and their presence and development in the other species also require attention. In this connection it is to be noted that in the species with unicolorous elytra those which are winged have the elytra less convex and cylindrical, and much more strongly ampliate at the base on each side of the peduncle than those which are without wings. This difference in the amplitude of the elytra between the winged and the wingless species is noticed less along the lateral border than above the border, a result evidently caused by the necessity for a greater dilatation to cover the bases of the wings in the winged forms. Though this is apparently a feature of high importance, and readily noticeable, it has not appeared to me very suitable for tabulation purposes, the differences being merely of degree; and differences which are not trenchant are generally unsatisfactory in tables, as liable to misinterpretation. (3)The relative length of the posterior femora as compared with the abdomen seems to me merely of specific value, there being all degrees of length; in the species with short posterior femora the posterior trochanters do not extend behind the posterior margin of the third ventral segment. (4)The form of the two basal ventral segments varies; the first segment is triangular in *M. cylindrica*, and with inner part much narrower and more extended in *M. crucigera*; there seem all degrees of difference between these forms; the second segment is much longer, especially behind the posterior coxal cavities, in *M. cylindrica* than in the wider-bodied winged species. (5)The distance between the intermediate and posterior coxæ varies; it is shortest in *M. howitti*, *M. greyana* coming next; it is merely a specific difference.

Table of Species.

- A. Elytra green or violaceous, with never more than an apical testaceous mark on each elytron.
- B. Labial palpi with basal stalk short, not projecting beyond apex of lobes of mentum. (Wingless. Posterior femora not extending beyond apex of abdomen. Elytra unicolorous).
 - c. Pronotum with sides obtusely rounded vertically and without trace of a lateral carina even near anterior angles. Legs and apex of abdomen testaceous..... *M. cylindrica* Macl.
 - cc. Pronotum with sides sharply subcarinate near anterior angles. Legs and apex of abdomen black.....*M. frenchi* Sl.
- BB. Labial palpi with basal stalk long, projecting beyond lobes of mentum.
 - D. Species with elytra unicolorous (except a very narrow apical margin in *M. castelnaui*).
 - E. Species without wings. Elytra convex, or cylindrical, lightly ampliate on each side of peduncle; puncturation obsolete towards apex.
 - f. Elytra parallel, cylindrical. Posterior femora in ♀ not reaching beyond apex of abdomen. Metasternum wider between intermediate and posterior coxæ than mesepimera and basal border of metepisterna together.
 - g. Elytra smooth and finely punctate near shoulders. Posterior femora (♀) not reaching apex of abdomen... ..
 *M. spenceri* Sl.
 - gg. Elytra rough and coarsely punctate near shoulders. Posterior femora (♀) attaining apex of abdomen (in ♂ extending a little beyond apex)..... *M. greyana* Sl.
 - ff. Elytra short, oval; disc convex longitudinally as well as transversely. Posterior femora (♀) extending beyond apex of abdomen. Metasternum very narrow between intermediate and posterior coxæ, not wider than mesepimera and border of metepisterna together.....*M. howitti* Cast.
 - EE. Species with wings. Elytra subdepressed, strongly ampliate on each side of peduncle; puncturation extending to apex. or not.
 - h. Elytra with punctures extending to apex.
 - i. Ventral segments punctate. Prothorax with lateral carina obsolete behind anterior transverse impression.
 - j. Elytra unicolorous... .. *M. pulchra* Brown.
 - jj. Elytra with narrow testaceous apical margin.....
 *M. castelnaui* Sl.

- ii. Ventral segments impunctate. Prothorax with lateral carina extending backward almost to base.....
*M. blackburni* Fleut.
- hh. Elytra punctate on basal half, puncturation obsolete towards apex. (Prothorax with lateral carina extending backwards to posterior transverse impression)..... *M. murchisoni* Fleut.
- DD. Species with apex of elytra widely testaceous..... { *M. australis* Chaud.
M. helmsi Blackb.*
- AA. Elytra with sides of a more or less clear testaceous or brownish colour. Elytra punctate or wavy-rugose-punctate. (Winged species).
- k. Prothorax with lateral carina not extending backwards to posterior transverse impression.
- l. Abdomen with all the segments testaceous on sides. Male with left mandible bifurcate at apex.....*M. crucigera* Macl.
- ll. Abdomen with two basal segments metallic laterally. Male with left mandible of normal form, 3-dentate.
- m. Prothorax with posterior transverse sulcus decidedly terminated at place of lateral carina, not reaching sulcus of pro-episterna. Antennæ with basal joints clear testaceous.....*M. intermedia* Sl.
- mm. Prothorax with posterior transverse sulcus continued in a more or less distinct course laterally to the extreme border of the pronotum opposite the sulcus of the pro-episterna. Antennæ with four basal joints fusco-maculate.
- n. Metepisterna lightly and widely obliquely concave. Elytra with inflexed border not excised opposite third ventral segment.....
*M. basalis* Macl.
- nn. Metepisterna with a deep concavity. Elytra with inflexed border decidedly excised opposite third ventral segment.....
*M. bostocki* Cast.
- kk. Prothorax with a strong lateral carina extending from anterior angle backwards past posterior transverse impression. Elytra with wavy-rugose-punctate sculpture.
- o. Elytra with clear subttestaceous margin dilated inwards at about basal third.....*M. australasiæ* Hope.
- oo. Elytra green with narrow obscure brownish lateral margin.....
*M. scapularis* Macl.

MEGACEPHALA PULCHRA BROWN.

Dr. W. Horn, of Berlin, kindly sent me a specimen (♀) of *Tetracha pulchra* Brown, "identical with type." The following

* *M. helmsi* is the only species I have not seen.

features, not noticed in the original description, or inaccurately stated, require recording. The puncturation of the elytra, though becoming very fine at the apex, is not actually "obsolete." The prothorax has the lateral carina strongly developed just behind the anterior angles, but quite obsolete behind the anterior transverse impression; the sides are hardly incurved laterally. The ventral segments 3-6 are finely punctate behind the posterior coxæ.

♂. (From a specimen in the collection of the National Museum, Melbourne), with apical (sixth) ventral segment more strongly punctate than female, and with the usual median notch so reduced as to be with difficulty perceived; in fact it may be called *obsolete*.

I have detected the presence of wings in *M. pulchra*.

MEGACEPHALA CASTELNAUI, n.sp.

Green; head between eyes dark in middle with golden tints on each side; prothorax with middle of disc bluish-black; elytra with a golden tint on disc in some lights, apex with narrow testaceous margin. Mandibles (apex black), labrum, antennæ, palpi, and legs testaceous (tibiæ, palpi, antennæ, except basal joint, paler). Underside of prothorax, sides of body, and anterior ventral segments green; two penultimate ventral segments brown in middle, becoming lighter-coloured towards sides; apical segments subtestaceous.

Prothorax with a lateral carina on anterior fourth. Elytra strongly punctate, puncturation strong on basal half, becoming finer posteriorly, continuing to apex; the derm smooth between the punctures (though slightly undulate on lateral parts of basal half of disc). Ventral segments longitudinally rugulose towards sides, segments 3-6 finely punctate backwards from posterior coxal cavities. Length 18, breadth 7 mm.

Hab.—S.W.Aust.: Norseman District (*vide* French; Coll. French; unique).

Having the puncturation of the elytra extending to the apex, this species requires comparison only with *M. pulchra* Brown, and *M. blackburni* Fleut. It is closely allied to *M. pulchra*, having the same small round separate punctures impressed in the derm of the elytra, and the abdomen similarly punctate (the punctate ventral segments differentiate *M. pulchra* and *M. castelnavi* from all the other described species of Australia). *M. castelnavi* differs from *M. pulchra* by the testaceous apical margin of the elytra (this testaceous margin is less than 1 mm. in width); the sides of the prothorax behind the anterior impression less rounded vertically, and with obsolete traces of a carina, of which no trace is found in *M. pulchra*; the lateral margin of the prothorax decidedly incurved outside the position of the lateral carina (hardly incurved but simply rounded in *M. pulchra*); the transverse impressions of the pronotum more strongly impressed. From *M. blackburni* it differs (from Fleutiaux's description) by elytra with apex testaceous, and not so strongly punctate posteriorly; prothorax with lateral carina not strongly developed behind anterior transverse impression; abdomen punctate (impunctate in *M. blackburni*).

The type specimen is in a crushed and damaged state.

MEGACEPHALA BLACKBURNI Fleutiaux.

A specimen (♂) which it seems necessary to place under *M. blackburni* Fleut., has been sent to me by the Rev. Thomas Blackburn. It resembles *M. pulchra* Brown, in colour, except that it has a black sutural patch on the basal half of the elytra, this patch being bounded laterally by the subsutural row of foveæ. It differs decidedly from *M. pulchra* by ventral segments impunctate, lateral carina of prothorax extending strongly backwards behind the anterior transverse impression, the apical puncturation of the elytra much stronger. My specimen also differs from *M. pulchra* (♂) by the apical ventral segment strongly notched. It only differs, as far as I can see, from the description of *M. blackburni* (the sex not given) by the

lateral carina of the prothorax ending a little before the base; it attains the base in *M. blackburni* according to Fleutiaux.*

I have found no variation in the lateral carina of the prothorax in any Australian species of which I have seen more than one specimen, but Dr. Horn has informed me that this character varies in African species of *Megacephala*; possibly it does so in *M. blackburni*.

MEGACEPHALA INTERMEDIA, n.sp.

♂. Allied to *M. basalis* Macl. (in general appearance intermediate between *M. basalis* and *M. crucigera* Macl.). Head, prothorax, sides of mesosternum, metasternum, and basal ventral segments green; elytra with wide testaceous margin and a discal viridescent anchor-shaped mark (posterior part of this mark wide and nigro-viridescent). Elytra with apical edge minutely serrulate. Length 13·5, breadth 6 mm.

Hab.—N.W. Aust.: King's Sound (Macleay Museum), Carnot Bay (*vide* French). Colls. Macleay Museum, French, Lea, Sloane.

This species is in the Macleay Museum under the name of *Tetracha australasie* Hope, a species which European coleopterists consider conspecific with the species known in Australian collections as *T. humeralis* Macl.

M. intermedia (♂) differs from *M. basalis* (♂) by left mandible with apical tooth very long, narrow, and extending greatly beyond the penultimate tooth, the third tooth (counting apex) as large and as prominent as the penultimate tooth; labrum with four triangular pointed teeth of nearly equal size in middle (in *M. basalis* ♂ these teeth are represented by inconspicuous obtuse prominences); antennæ without black maculæ on basal joints. The prothorax is generally similar, but not so strongly constricted opposite the posterior transverse impression; this impression not reaching the sides of the pronotum to join the basal furrow of

* I subsequently sent this specimen to Dr. W. Horn, who wrote under date of 12th April, 1906, "To-day I got Fleutiaux's type of *Tetracha blackburni*; the specimen you gave me is without doubt the same species. . . . The carina of the pronotum, the posterior sulcus, the formation of the posterior lateral angles, the sculpture of the elytra, etc., are identical."

the prosternum as in *M. basalis*; lateral carina longer. The elytra have a similar pattern. Its general appearance and facies is that of *M. crucigera* Macl., which sometimes has the anchor-shaped mark of the elytra equally large, but it differs by the abdomen not testaceous along sides to the posterior coxæ, piceous-black in the middle to and including the fourth segment; left mandible in ♂ not bifurcated towards apex, &c. The metepisterna resemble those of *M. crucigera*, being flat and rugulose, hardly widely and feebly concave posteriorly [in *M. basalis* the metepisterna are decidedly concave posteriorly; in *M. bostocki* Cast., (?= *M. excisilatera* Sl.) they have a deep pit or concavity]. In *M. intermedia* the antennæ are wholly testaceous as in *M. crucigera*, not with basal joints fusco-maculate as in *M. basalis* and *M. bostocki*. This species has also a slight emargination of the inflexed margin of the elytra opposite the third ventral segment, a feature which becomes conspicuous in *M. bostocki* but is wanting in *M. basalis*. The apical border of the elytra is minutely serrulate, a character I have only noticed in *M. humeralis* Macl., and *M. scapularis* Macl., among our species.

MEGACEPHALA BOSTOCKI Castlenau.

In his "Index" Dr. Horn follows M Fleutiaux (whose idea of *M. (Tetracha) basalis* Macl., included *M. (Tetracha) excisilatera* Sl., in considering *M. (Tetracha) bostocki* Cast., as synonymous with *M. basalis* Macl.; but, for reasons given below, I cannot concur in this synonymy, and therefore regard *M. bostocki* Cast., as a good species under which I believe *Tetracha excisilatera* Sl., must be placed. The Rev. Thomas Blackburn has informed me that he had considered as *M. (Tetracha) bostocki* Cast., the species which I described under the name *T. excisilatera*; and subsequent consideration of the original description of *T. bostocki* inclines me so strongly to accept Mr. Blackburn's opinion that I now adopt it, though it is a question that cannot be absolutely settled, except by examination of Castlenau's type of *T. bostocki*, or by collecting at Nickol Bay. Castlenau's description of *T. bostocki*, poor as it is, contains two points that

seem to compel the recognition of his species as that which I subsequently named *T. excisilatera*; these are (1) elytra "black," &c., (2) anterior angles of prothorax "much more rounded" than in *M. humeralis* Macl. Among the species known to me, only *T. excisilatera* Sl., has elytra that could be called *black*, and the prothorax with anterior angles *more rounded* than in *M. humeralis* Macl. When I described *T. excisilatera* I relied on Fleutiaux's synonymy of *M. basalis* Macl.

Hab.—Tropical Australia: Nickol Bay (*vide* Castelnau): Barrow Creek (*vide* French). Colls. French, Blackburn, Sloane, Macleay Museum.

MEGACEPHALA AUSTRALASIE Hope.

Dr. W. Horn formerly expressed the opinion* that *Tetracha scapularis* Macl., (evidently following Fleutiaux he included *T. hopei* Cast., under *T. scapularis*), and *T. humeralis* Macl., were varieties of *Megacephala australasie* Hope (he says the dark elytral marking becomes enlarged towards the end, and forms a cross in *M. australasie* Hope). Subsequently having visited London, Tring, and Oxford, and having seen the collections in those places, he reversed his views about *T. scapularis* after seeing the type-specimen of *T. hopei* Cast., in the British Museum, and recognised it as a good species.†

In his "Index" (1905), *M. humeralis* Macl., (which Dr. Horn has informed me is known to him), is placed as a variety of *M. australasie* Hope. No doubt this is the opinion of Dr. Horn after seeing types of *M. australasie*; and, therefore, it must be accepted as a correct view. Seeing that *M. humeralis* has a very wide range (I have species from Queensland, Port Darwin and Carnot Bay), while any form with the discal pattern forming a cross is unknown in Australian collections, it looks as if this were the dominant form, *M. australasie* Hope, being merely a local race. Be that as it may, it appears to me that, as far as Australian collections are concerned, the name *M. humeralis* Macl., may

* Deutsche Ent. Zeit. 1896, p. 353.

† *Op. cit.* 1898, p. 194.

well be recognised, at least till we become acquainted with Hope's typical form. The variety *M. nickerli* Srnka, from Cooktown, is of a wholly testaceous colour.

Habits.—Never having taken a species of *Megacephala*, I have no personal knowledge of their habits; but I am able to give a few notes from the observations of others.

Mr. Masters informed me that he found *M. crucigera* Macl., coming out from its diurnal hiding places in the evening, on sand banks along the river Burnett at Gayndah in Queensland.

The types of *M. humeralis* Macl., were found by Mr. Masters "in considerable numbers under rubbish in the dry sandy bed of the river Don," near Port Denison,* and Mr. F. P. Dodd wrote to me that he found this species "along salt pans near Townsville."

Mr. C. French writes to me that he has found "*Tetracha* [*australis* Chaud.] running about on the margins of salt lakes [in the Mallee District, N.W. Victoria], and that he has been informed that "*M. murchisoni* Fleut., and other species from Western Australia are found in similar haunts." Mr. C. French, junr., wrote to me that he found *M. australis* "on the sandhills in the mallee in the hottest part of the day, and under logs on the margins of swamps at Benjeroop near Kerang" [Victoria]; and that he also obtained "two specimens one evening on the edge of Lake Albacutya at a lighted candle placed in the middle of a sheet spread out on the ground, evidently attracted by the light." Mr. H. J. Hillier, when sending a specimen of the larva of *M. australis*, and the drawings of the larva for Plate xxxi., wrote to Mr. Lea, "I had often noticed small holes a good $\frac{1}{8}$ -inch in diameter in places around the beds of (dry) lakes on Cooper's Creek (where I lived for several years); and so I dug down, following some of the holes, and then I found the larva always head upwards in the hole as I have drawn it. The holes were about $2\frac{1}{2}$ -3 feet deep. I do not know whether they would go deeper, but these holes were almost down to the level of the

* Cf. Macleay, Trans. Ent. Soc. N.S. Wales, i. p. 9.

soakage water—within about six inches. The blacks have no real name especially for these larvæ, but call them 'Kintala,' which name they also use for another larva, and also for a dog, so that they do not know much about these particular larvæ. Kintala is a word of the Diara tribe which inhabits the Killalpaninna district."

Recently Mr. Lea sent me a note on the larva of *M. crucigera* which he received from Mr. J. A. Anderson, of Cairns, Queensland. Mr. Anderson when sending the larvæ wrote under date of 10th April, 1906—"I got some larvæ of *Tetracha crucigera* this afternoon. There are scores of these in my yard, but as I had not much time, I could only get a few; they are rather difficult to get out of the earth, as they go down about a foot or eighteen inches. I got these by putting a straw two or three inches from the top, when they came up to push it out, and I then dug them up with a spade before they could go down again. I could not get any adults in the ground, nor have I seen any for the past month or two."

Tribe **Cicindelini.**

The component parts of the tribe Cicindelini, as represented in Australia, are variable; in this showing a marked difference from the closely allied types (all of the genus *Cicindela*) found in the Palæarctic and Nearctic regions of the globe. Before tabulating the genera I propose to notice briefly some characters of high taxonomic importance, but of which the full value can only be estimated by someone with a knowledge of the Cicindelini of the whole world.

Labrum.—Lacordaire says the labrum varies greatly in respect of form and particularly of size; and it is a constant rule that, in every case in which it is dentate in front, the teeth are more pronounced in the female than in the male (Genera, p. 2). The shape of the labrum varies very little in some genera, e.g., *Megacephala* and *Distypsidera*; but in the genus *Cicindela* (especially if the division I have called *Cicindelæ spurice* be retained in the genus) it is very variable, although, as far as my

observations go, constant in each species, except that often it differs in the sexes, such sexual differences being constant. In the genus *Cicindela*, *sensu lato*, as represented in Australia, there are two quite different forms of the labrum. (1) The *Distypsidera*-like form, which, though showing considerable variation, is always large, convex, 7-dentate, the posterior tooth being a lateral one (in *C. iosceles* Hope, the two teeth behind the one at the extreme apex are bidentate, so that the labrum appears 11-dentate). In the *Distypsidera*-like form the setæ are marginal, a seta being found in every notch between the teeth. (2) The true *Cicindela*-form, which is shorter (and never of the 7-dentate form with lateral outer teeth) has the setæ placed a little behind the anterior margin (submarginal).

Mentum.—This varies greatly. In the typical species of the genus *Cicindela* the median tooth is very long, while in *Distypsidera* and *Nickerlea* it is reduced to a mere obtuse prominence at the bottom of the sinus (figs. 13, 14). In the genus *Cicindela*, as used in this paper, it varies greatly, for in *C. semicineta* Brullé, and all allied species, the median tooth is longer and more acute than in *C. ypsilon* Dej.; while in *C. doddi* Sl. (tooth small, but sharp and triangular), *C. iosceles* Hope (tooth similar to that of *C. doddi*, but a little less developed), and *C. leai* Sl. (a little more reduced, but still distinct and triangular), it is very much smaller than in *C. ypsilon*.

Labial palpi.—All those species which have the median tooth of the mentum greatly reduced in size have the basal piece and two basal joints of the labial palpi stout, and the apical joint small; the true *Cicindela*-form is to have the penultimate joint of the palpi long and slender.

Colour.—Dr. W. Horn has informed me that, in the Cicindelidæ, the dark portion of the elytra must be taken to be the ground-colour, the whitish marks so frequently found on the elytra being the secondary part of the pattern; a proper appreciation of this fact is important. Leng in his "Revision" has the following:—"In the maculate species the punctures cease, or nearly cease, within the maculation, which is visible on the

other side of the elytron when it is detached from the beetle."* This refers to the genus *Cicindela*; in *Distypsidera* and *Rhyso-pleura* the puncturation does not cease within the maculation. Dr. Horn has expressed the opinion, in a letter to me, that the pattern of the elytra in species is so variable that it should be used as sparingly as possible in tabulating them; in fact, he would prefer never to use it in synoptic tables. This opinion (with which I concur) has considerably influenced my tabulation of the genus *Cicindela*; but in the genus *Distypsidera* I have been unable to dispense with colour-differences between the species, though I do not feel confident as to their being very reliable. Notwithstanding the view expressed above on the objection to colour-differences in synoptic tables, colour has an importance in the Cicindelidæ that cannot be overlooked, e.g., (1) the testaceous elytral margin in many species of *Megacephala*; (2) the median transverse maculæ in *Distypsidera*; and (3) the colour of the under surface, e.g. (a) ferruginous in *Cicindela slounei* Lea; (b) æneous in *C. ypsilon*, *C. tetragramma*, &c.; (c) chalybeous in *C. plebeia*, *C. doddi*, &c.†

Puncturation.—This character is important. In the genus *Cicindela*, Leng notes four types of elytral puncturation:— (1) "impunctate" (applied to North American species of the *C. scutellaris*-group); (2) "simply punctate" when "without elevated granules beside each puncture"; (3) "granulate-punctate" when "the surface is roughened with raised points as well as with depressed punctures"; (4) "semipunctate" when "merely the anterior half is punctate."‡ I have not used these terms, but would draw attention to the great difference in the puncturation in *C. semicincta*, *C. nigrina*, and *C. aurita*.

* Trans. Amer. Ent. Soc. xxviii. p. 114, 1902.

† Having brought this opinion under the notice of Dr. Horn, he wrote in reply:—"I agree completely with you; in my first paper (Monographie der palaarktischen Cicindelen, p.3) I expressed this opinion. Only as a character for species I do not think much of it."

‡ *Op. cit.* p. 112.

Table of Australian Genera of the Tribe Cicindelini.

Labial palpi with basal stalk long; (penultimate joint long, slender. Propisterna rugulose. Elytra simply punctate. Head with one supraorbital seta. Under surface glabrous).....*Rhysopleura*.

Labial palpi with basal piece short.

Elytra with intricate punctate-undulate sculpture. (Head with one fully developed supraorbital seta.† Under surface and all coxæ glabrous. Metepisterna with a deep horse-shoe-shaped impression posteriorly).....*Distysidera*.

Elytra not with punctate-undulate sculpture.

Body, including all sternal side-pieces and coxæ, glabrous. Head with one fully developed supraorbital puncture. Clypeus with a juxta-antennal seta on each side.....*Nickerlea*.*

Body normally with at least some bristles or pubescence on one or more of the sternal sidepieces and coxæ (in *tetragramma*-group body and posterior coxæ glabrous). Head with two fully developed supraorbital punctures. Clypeus without juxta-antennal setæ*Cicindela*.

RHYSOPLEURA, n.g.

Head with one supraorbital setigerous puncture; clypeus bisetigerous. *Mentum* with a distinct pointed median tooth; lobes pointed at apex. *Maxillæ* with outer lobe two-jointed;

* The characters attributed to *Nickerlea* here are those of *Cicindela sloanei* Lea; *N. distysideroides* Horn, the type of the genus, is unknown to me in nature, but I believe it will show the setæ of the head and clypeus as in *C. sloanei*, which I place in *Nickerlea* with considerable hesitation.

† While this paper has been passing through the press, I have been informed by Dr. Horn that, in the genus *Distysidera*, there is a small fine anterior intraorbital seta placed as in the genus *Cicindela*. Dr. Horn reports this seta in *D. undulata*, *D. gruti*, and *D. flavipes*; and I have since found it in *D. parva*. I had failed to detect this little seta, the pore from which it rises being so minute that, if the seta is rubbed off (as it usually is, judging from any specimens of *Distysidera*) its presence would not be suspected. I have not thought the discovery of this greatly reduced anterior seta invalidates entirely the distinction I have sought to establish between the genera *Distysidera* and *Cicindela* by the use of the supraorbital setæ; but for the sake of accuracy, and to prevent misunderstanding, I now refer to the *fully developed* supraorbital setæ. In *Distysidera* the posterior seta is placed much more forward than in *Cicindela*.

inner lobe with an articulated hook. *Palpi*: *labial* slender, longer than *maxillary*; basal stalk long; first joint very short; second (*penultimate*) joint narrow, very long, reaching to anterior coxæ, plurisetose on lower side; *maxillary* slender, apical joint longer than *penultimate*. *Labrum* (♀) large, covering mandibles; apex wide, obtuse; a rather strong tooth followed by a very small second tooth on each side behind apex; margin 6-setose; four closely placed setæ on the obtuse apex, and one on each side in the notch before posterior lateral tooth. *Pronotum* orbiculate (disc tumid and almost hemispherical), rugulose. *Scutellum* dividing elytra at base. *Elytra* with derm closely punctate; puncturation rather strong towards base, very fine towards apex, strongly punctate basal part with obscure ferruginous marks, more finely punctate part sericeous. *Under surface* (including coxæ) glabrous; pro-episterna convex, rugulose; metepisterna longer than broad, lightly longitudinally concave and transversely rugulose. *Legs* very long and slender; posterior femora slightly bent opposite sides of elytra as, in *Distypsidera*; intermediate tibiæ in male not pubescent on inner side near apex; tarsi long, first joint almost as long as second and third together, third much shorter than second, fourth shorter than third, elongate-triangular, not emarginate at apex; male with joints 1-3 squamulose beneath, 4th widely dilatate.

Type *Distypsidera orbicollis* Sloane.

RHYSOLEURA ORBICOLLIS Sloane.

Distypsidera orbicollis requires a new genus, which, notwithstanding its very different labial palpi, is nearer *Distypsidera* than to any other Australian genus. It is, however, extremely isolated, and I do not know its natural position in the tribe Cicindelini.

Mr. F. P. Dodd has informed me that *R. orbicollis* "is found on mossy trunks of scrub-trees."

Genus DISTYPSIDERA.

The genus *Distypsidera* is at once isolated and characterised by the undulate-plicate-punctate sculpture of the elytra. The

D. volitans Macl., is very closely allied to *D. undulata*, but has the sculpture everywhere finer. It makes its appearance further to the north than *D. undulata* (Port Denison and Townsville). I do not know the limits of the range of *D. undulata* northward, but it seems to me probable that, if the ranges of *D. undulata* and *D. volitans* meet or overlap, there may be great difficulty in differentiating these species where they are found together. Dr. W. Horn has informed me recently that, from material obtained since he described *D. levisculpta*, he now considers that name must become a synonym of *D. volitans*. A specimen (♂) in the National Museum, Melbourne, ticketed Queensland, has the humeral macula reduced to merely a little dot, so that the elytra before the median fascia appear at a casual glance quite black.

D. flavicans Chaudoir (= *D. cursitans* Macl. = *D. strangei* Cast.) is a much smaller species than *D. undulata* and *D. volitans*, and has the sculpture finer, especially near the base. Its most distinctive character is to have the posterior lateral tooth of the labrum placed much further forward than in the other species of the genus. It has the labrum with the central testaceous part very wide; elytra with base testaceous; palpi in male pale testaceous with the apical joint merely infuscate at apex. With the material before me I am not prepared to separate *D. mastersi* Macl., from *D. flavicans* Chaud., yet I would not declare definitely that these names are synonymous.

D. gruti Pasc.* (= *D. plustchevskyi* Dokht., = *D. interrupta* Dokht., and *D. pascoei* Macl.). I place under *D. gruti* Pasc., all the forms that I have seen without any apical maculæ (excepting the distinct species *D. parva* Macl.). The typical form has the elytra dark cyaneous black, each elytron 5-maculate, as shown in fig. 69 (but with inner basal macula larger, as in fig. 68). Pascoe's description is founded on the female, as is shown by his describing the palpi as "black, second and third joints of the

* *D. papuana* Gestro, is allied to *D. gruti* Pasc.; cf. Horn, Deutsche Ent. Zeit. 1893, p. 331. It is the only extra-Australian species known.

labial yellowish-white." The male has only the apical joint of both labial and maxillary palpi black. Specimens from Cairns vary from 13·5 (♂) to 16 (♀) mm. in length; they also vary in pattern of the elytra (as shown in figs. 68, 69 and 70). Other specimens received from Mr. French, as from North Queensland, are equally large but have the posthumeral and humeral maculæ united. The legs vary in colour from all black (except trochanters and an apical spot on four anterior femora) in a specimen (♀) from Mr. French, ticketed "Endeavour River," to femora ferruginous (except upper side, more particularly towards apex, piceous-black); tibiæ ferruginous with outer side infuscate in a specimen (♂) from Cairns. The colour of the legs is evidently of slight importance in *D. gruti*.

Var.? A. There remains a small form from Cairns in which the colour of the upper surface is darker, the elytra without an inner basal macula on each side of the scutellum, and with the humeral macula extending backwards in a slender stripe (figs. 66, 67). Length 13·5 mm ♀. Possibly this may represent a distinct species, but more data than I possess would be required to form a decided opinion on this point. It may be noted that var. A so closely resembles *D. volitans* Macl., that it seems impossible to separate these species except by the presence of the apical maculæ in *D. volitans*.

D. parva Macleay, has more affinity to *D. flavicans* Chaud., than to any other species. Labrum testaceous with a narrow lateral margin; metasternum in male testaceous, in female piceous in middle with sides testaceous; palpi pallid, apical joints in female piceous, in male hardly infuscate just at apex.

Genus NICKERLEA.

NICKERLEA DISTYPSIDEROIDES Horn.

From Dr. Horn's Latin diagnosis of this species I take the following excerpts:—

"Differt a *Distypsidera flavicante* Chaud., labro paullo brevior, antice latius truncato et in parte centrali antica dentibus 3 (non dente una) perparvis (vix percipiendis) ornato: dentibus 2

majoribus in utroque latere fere ut in illa specie, toto unicolori obscure metallico thorace brevior antice magis dilatato marginibusque lateralibus magis arcuatis; elytris serie punctorum majorum rarorum juxta-suturali evidente; . . . signatura alba: maculis 3 sat magnis marginalibus, prima humerali vix marginem sequente, secunda media, tertia antepicali subtus cyaneo-nigricante; pedibus testaceo-rufis. Long. $10\frac{1}{2}$ mm. (sine labro). 1 ♀ (?) Australia bor. (Odewahn)."

In the short generic diagnosis we find "*Corpus (cum coxis posticis) glabrum.*" It is, from the above notes, allied to *C. sloanei* Lea, but differs at once by colour of under surface "*cyaneo-nigricante*" (not reddish-testaceous; the colour of the under surface is an important character in the genus *Cicindela*; *C. sloanei* Lea, is the only Australian species known with the under surface ferruginous); elytra with three lateral white maculæ. The antennæ were wanting in the type of *N. distypsideroides*, therefore its true relationship towards *C. crassicornis* Macl., cannot be accurately known. It seems to have some resemblance to *C. crassicornis*, but that species has the labrum "white" and the metepisterna and posterior coxæ hirsute.

NICKERLEA SLOANEI Lea.

Cicindela sloanei Lea, may not be congeneric with *Nickerlea distypsideroides* Horn; but, be that as it may, it seems best to consider it so till these two species can be compared. The following characters not alluded to in Mr. Lea's description require notice:—♂. Labrum large, convex, outline rotundate, 7-dentate (the teeth as in *Distypsidera*, but smaller, viz., three on the obtuse apex and two on each side, see fig. 21). Labial palpi short, resembling those of *Distypsidera*, but penultimate joint shorter and still more inflated, with a few short setæ on each side; apical joint very small. Antennæ slender, resembling those of *Distypsidera*. Clypeus with a setigerous puncture on each side near antenna. Prothorax broader than long (1.5 mm × 1.7 mm.). Under surface glabrous, including all the coxæ.

I may here note that *N. sloanei* seems an ancient form descended from a stem in which the pubescence of the body had never been acquired, and thereby differing from the *tetragramma*-group of the genus *Cicindela* in which I believe the pubescence to have been lost.

Mr. Lea's description is wrong in saying "prothorax slightly longer than broad." I have the type before me (kindly lent by Mr. Lea), and find its thorax broader than long, the measurements being as given above. Also, by a slip, the word "clypeus" has been printed instead of *labrum* in the original description. The labrum in the male is dark with a median testaceous stripe, in the female of a uniform dark colour. It was found by Mr. Lea running actively on the sandy bed of a dry creek at Mullewa, W.A.

Genus CICINDELA.

Table of Species Groups.

- i. Labrum large, convex, 7-dentate, posterior tooth on each side lateral; setæ marginal.* Mentum with median tooth small or obsolescent. Labial palpi stout, apical joint small.....CICINDELÆ SPURILÆ.
- A. Antennæ with joints 5-11 swollen. (Elytra with subsutural row of foveæ)*iosceles*-group.
- AA. Antennæ slender.
- B. Pronotum not strongly transversely impressed. Elytra opaque, subsericeous, not strongly punctate; a subsutural row of lightly impressed foveæ.....*doddi*-group.
- BB. Prothorax encircled by a strong impression anteriorly and posteriorly. Elytra convex, nitid, covered with a strong and dense puncturation.....*tenuicollis*-group.
- ii. Labrum short, never with lateral teeth, setæ submarginal. Mentum with median tooth long, pointed. Labial palpi slender, apical joint elongateCICINDELÆ VERÆ.
- C. Prothorax encircled by a deep anterior impression; pronotum convex, glabrous. Elytra convex, covered with a strong puncturation, dark green, not opaque (each elytron 3-maculate). ♀. With proepisterna sparsely setose near coxæ; mes- and metepisterna glabrous; apex of each elytron deeply excised and with a long apical sutural spine.....*nigrina*-group.

* Sometimes the labrum has more than seven teeth, e.g., *C. iosceles* Hope, ♀, and *C. doddi* Sl., ♀, but the extra teeth in these cases are small and seem merely a modification of the normal 7-dentate form.

- CC. Prothorax and elytra subdepressed. [Pronotum (a) glabrous, (b) covered with setæ, or (c) setose along lateral margins. Elytra glabrous or setose near shoulders. Under surface normally with all sternal side-pieces and posterior coxæ setose (glabrous only in the *tetragramma*-group). Head glabrous or setose].
- D. Body glabrous (except four anterior coxæ). Pronotum, at least in ♀, with prominent posterior angles.....*tetragramma*-group.
- DD. Various parts of body setose, including always all sternal side-pieces and posterior coxæ. Pronotum never with prominent posterior angles.
- E. Elytra with dark parts of pattern metallic (brassy or bronzy) and with a large lateral and apical area white.
- F. Pronotum and elytra glabrous.....*ypsilon*-group.
- FF. Pronotum (including disc) and elytra near base setose.....
.....*igneicollis*-group.
- EE. Elytra with groundcolour dark, opaque, some whitish markings, either narrow and lateral, or maculiform on posterior half of disc. Pronotum setose along lateral margins only. ♀. With a small nitid or subnitid dark spot on disc of elytra a little before middle... ..*semicincta*-group.

CICINDELÆ SPURIAE.*

The division of the genus *Cicindela* (*sensu lato*) for which I use the name *Cicindelæ spuria* includes Dokhtouroff's genus *Antennaria*, founded on *C. iosceles* Hope. I regard the generic name *Antennaria* as preoccupied by the previous use of *Antennarius*; and also I doubt whether the swollen antennæ are in themselves a character of sufficient importance to justify the formation of a genus, considering the existence of the somewhat allied species, *C. doddi*, with slender antennæ. *C. tenuicollis* Macl., does not seem to have any close affinity to *C. iosceles* or *C. doddi*; but it can be grouped with these species by some features of importance, as given in the table above, which also

* Dr. Walther Horn had formerly applied the name *Euryodæ spuria*, and latterly *aberrant forms of Cicindela* to the species I have called *Cicindelæ spuria*; I was unaware of this when I proposed to divide the Australian species of *Cicindela* into *Cicindelæ spuria* and *Cicindelæ vera*.

serve to separate it most decidedly from the typical species of *Cicindela*. It is, I believe, the intention of Dr. Horn to review the great genus *Cicindela* as a whole, and arrange the species in groups; should he carry out this project he will doubtless fix the position and value of my *Cicindela spuria* authoritatively

Iosceles-Group.

Two species of this group are known, namely, *C. crassicornis* MacL., and *C. iosceles* Hope. I have examined the type of *C. crassicornis*, in the Macleay Museum, in comparison with a specimen of *C. iosceles*, and separated them thus:—

Pro- and mesepisterna glabrous; metepisterna and posterior coxæ setose.....
*C. crassicornis* Macleay.
 Pro-, mes- and metepisterna setose.....*C. iosceles* Hope.

The shape of the prothorax is also very different, but I did not record the differences; speaking from memory, I may note that in *C. crassicornis* it is shorter and more rounded on the sides than in *C. iosceles*.

CICINDELA IOSCELES Hope.

Dr. Walther Horn has sent me a cotype of *C. platycera* Gestro, which he has noted as synonymous with *C. iosceles* Hope, from examination of Hope's types; this specimen of *C. platycera* is identical with my *C. hackeri*. It may be noted that in *C. iosceles* the male has the labial palpi with the apical joint green, the other joints testaceous; the female has the whole of the labial palpi dark greenish.

Range.—Cooktown (Hacker) to Port Essington (*fide* Hope).

Doddi-Group.

CICINDELA DODDI Sloane.

In the description of *C. doddi* I have omitted to record that the type (♂) has the proepisterna with a few white setæ above the coxæ, and the posterior coxæ setose near the anterior external angle.

♀. Mr. F. P. Dodd recently sent me the female from Kuranda; it differs from the male by size larger (length 9 mm.), pro- and mesepisterna glabrous; labrum larger and longer, teeth far more prominent (median tooth prominent, triangular, flanked on each side by a subdentiform prominence; on each side of this wide tridentate median prominence a deep setigerous notch, and behind this setigerous notch two strong triangular teeth, side of labrum roundly dilatate some distance behind the outer of these teeth, a marginal seta just before this lateral dilatation). The description above applies to the labrum from the apex; taking it from the base it is wide, strongly sinuately narrowed at about half the length, 7-dentate before this lateral sinuosity of each side. I regard this as only a modification of the 7-dentate form of the labrum, in which the posterior lateral tooth has become reduced to a mere rounded prominence, and the second tooth from the base has become duplicated.

Tenuicollis-Group.

C. oblongicollis Macl., is closely allied to *C. tenuicollis* Macl. When examining the types of these species in the Macleay Museum, I could not fix on any point of difference between them, except the dark obscure colour of *C. oblongicollis*.

C. tenuicollis Macl., is characterised by its prothorax with a very deep encircling groove anteriorly and posteriorly, the intervening space being roundly convex.

C. leai Sl., is the same colour as *C. tenuicollis* Macl., but with prothorax wider (1.3×1.3 ; *C. tenuicollis* 1.25×1.1 mm.); pronotum with apical and basal sulci much shallower, sides and disc far less strongly rounded between these sulci. In fresh specimens a few scattered setæ may be noticed rising from the punctures towards the base of the elytra; doubtless similar setæ are present in fresh specimens of the other two species of this group.

CICINDELÆ VERÆ.

Nigrina-Group.

This group has only one species (*C. nigrina* Macl.), an ancient and isolated form remarkable for the shape of the apex of the

elytra in the female (fig.51). Fresh specimens show a few scattered setæ rising from punctures near the base of the elytra.

Tetragramma-Group.

Dr. Horn has informed me that, in the great genus *Cicindela*, with nearly 600 species, he knows of only one extra-Australian species (viz., the African *C. intricata* Dej.), with all the sternal side-pieces and the posterior coxæ glabrous. In Australia, among the sixteen known species of the *Cicindela veræ*, there is the *tetragramma*-group of three species with a similar want of pubescence. Dr. Horn also expressed in his letter the opinion that the *tetragramma*-group is a primitive one; and from this I see no reason to dissent, though I believe the *tetragramma*- and *ypsilon*-groups have branched from the same stem. In the case of the *tetragramma*-group I believe the pubescence of the sternal side-pieces and posterior coxæ has been lost (probably because, for some reason, they became of no vital importance to the species).

Table of Species.

Elytra with dark groundcolour compact, without a longitudinal discal white band extending backward from middle of base. (Prothorax with prominent posterior angles in both sexes).....	<i>C. aurita</i> Sl.
Elytra with dark groundcolour intricate, a longitudinal white band extending backwards from middle of base.	
Prothorax (♀) with posterior angles prominent, triangular. Elytra with sutural white vitta extending forward almost to base.....	<i>C. tetragramma</i> Boisd.
Prothorax (♀) with posterior angles subprominent, obtuse (in ♂ not prominent). Elytra with sutural white vitta on apical half—extending forward hardly beyond half the length of the elytra.....	<i>C. albolineata</i> Macl.

CICINDELA TETRAGRAMMA Boisduval.

Dr. Walther Horn has written to me that, from data I supplied to him, he is of opinion that *C. trivittata* Macl., is a form of *C. tetragramma* Boisd.; I believe there is but little doubt of the correctness of this view, so I place *C. trivittata* as a variety of *C. tetragramma*. It may be noted that Dr. Horn has drawn

attention to the deep excavation of the mesepisterna in *C. tetragramma*, female, which is not found in the male.* *C. tetragramma* is unknown to me in nature, but the allied species *C. aurita* Sl., has the mesepisterna lightly concave outward from the middle coxæ in the male, and far more deeply concave in the female, but in *C. ypsilon* Dej., *C. albicans* Chaud., and *C. rafflesia* the mesepisterna are somewhat similar in form, the sexual difference being sufficiently marked to enable the sexes to be determined by the greater (♀) or less (♂) concavity of the mesepisterna.

Ypsilon-Group.

I look upon *C. rafflesia* Chaud., as probably the most ancient form of this group in Australia; the emargination of the apex of the elytra in the female (found also in *C. nigrina* Macl., a species not closely allied to *C. rafflesia*) seems a primitive character. The small second tooth of the mandibles (counting from apex) is characteristic of this group.

Table of Species.

Labrum (at least in ♀) not unidentate. (Elytra with base of metallic groundcolour compact; apex of each elytron rounded)...*C. frenchi* Sloane.

Labrum in ♀ unidentate in middle.

- ♀. With each elytron deeply excised at apex and armed at inner angle with a very long spiniform mucro. (Apex of each elytron in ♂ rounded and with a short sutural mucro).....*C. rafflesia* Chaudoir.
- ♀. With each elytron rounded at apex and with a short sutural mucro.
 - ♂. Without mucro at sutural apex of each elytron and with apical curve hardly serrulate.....*C. ypsilon* Dej.
 - ♂. With a short mucro at sutural apex of each elytron, apical curve strongly serrate.....*C. albicans* Chaud.

CICINDELA FRENCHI Sloane.

The type (♀) is in the possession of Mr. French. I have not had it before me when writing this Revision, but have separated it from the rest of the *C. ypsilon*-group by the form of the labrum, as figured by Mr. Lea (fig.25).

* Deutsche Ent. Zeit. 1904, p.88.

CICINDELA YPSILON Dejean.

I regard the form found about Sydney as the typical form. It has the elytral pattern as in fig.84, the male being without any mucro at the sutural apex. It is hard to tabulate the differences between *C. ypsilon* and *C. albicans* Chaud., but, in all the specimens of the latter which I have seen, the apex of the suture of the elytra was mucronate in the male as well as in the female. The albescent form shown in fig.83 has, from a specimen in the National Museum, Melbourne, the sutural apex mucronate. This character and the form of the mandibles require careful attention with a large series of specimens from many localities before one.

Igneicollis-Group.

It appears to me that *C. blackburni* Sl., which is evidently closely allied to *C. setigera* Horn, yet has head and basal joint of antenna glabrous, is a species which helps to show that too much reliance must not be placed on the pubescence of parts of the body for arranging species in groups.

Table of Species.

Front and clypeus (also head beneath eyes) glabrous.....	<i>C. blackburni</i> Sl.
Front and clypeus setose.	
Elytra with a common metallic sutural patch giving off posteriorly a spatulate process on each elytron.....	<i>C. setigera</i> Horn.
Elytra with a common metallic sutural patch giving off posteriorly a narrow longitudinal subsutural stripe on each elytron, also outside the subsutural vitta two small metallic marks	<i>C. igneicollis</i> Bates.

CICINDELA BLACKBURNI, n.sp.

♀. Oval; prothorax (including pronotum), base of elytra and lateral parts of under surface beset with white hairs. Cupreous, elytra widely margined with white; the white margin extending from humeral angles to apex, indenting the cupreous discal area widely and lightly at basal fourth, very deeply at half the length, very lightly at apical third, and deeply and narrowly at apex near suture(fig.86).

Head rugulose-striolate, deeply channelled between eyes; front, clypeus and sides beneath eyes glabrous. Antennæ as in *C. ypsilon* Dej. (*i.e.*, four basal joints metallic, other joints blackish, stout). Prothorax broader than long (1.8×2.3 mm.), lightly rounded on sides; pronotum sparsely covered with white hairs over the whole surface; anterior and posterior transverse impressions not deep. Elytra oval (7×4.7 mm.); base with some white hairs on each side of scutellum; apex roundly emarginate with a short conspicuous spine at sutural apex of each elytron (at apex of apical emargination). Under surface, except middle of abdomen and metasternum, beset with white hairs. Legs albidopilose. Length 11.5, breadth 4.7 mm.

Hab.—S. W. Australia: Colls. French, Sloane (received by Mr. C. French as from the Norseman District, Norseman being 120 miles north of Esperance; approximate position lat. 32° S., long. 122° E).

It comes nearest *C. setigera* Horn, among described Australian species. Only the male of *C. setigera* is known to me, from which *C. blackburni* presents the following nonsexual differences: antennæ with basal joint glabrous (only one long white seta), clypeus, front and head beneath eyes without any white hair; cupreous groundcolour of elytra overspreading far more of the surface (extending to within 1 mm. of apex); the white margin is narrow at the humeral angles and has a width of 0.5 mm. just before and 0.7 mm. just after its median branch; this branch is 0.7 mm. in width and extends inward to within 0.8 mm. of the suture. Mr. French obtained two specimens (\varnothing), one of which he kindly gave to me.

CICINDELA SÆTIGERA Horn.

In his "Index" (1905) Dr. W. Horn places *C. jungi* Blackb., as a synonym of *C. setigera* Horn; and he has informed me by letter that, after seeing Rainbow's figure of *C. jungi*, he has no doubt of its identity with *C. setigera* Horn. I may add that one has only to compare Horn's figure with Rainbow's to be convinced that they represent the same species.

Horn described the elytra of *C. sætigera* as "hinc inde hirsutis"; whereas the specimens of *C. sætigera* which I have seen (all collected by Mr. George Masters many years ago at Wallaroo, on the shores of Spencer's Gulf) have the elytra only setose along the base on each side of the scutellum. I wrote to Dr. Horn on this point, and he courteously answered: "My type of *C. sætigera* has, as it is now, only bristles on the shoulders, but I remember very well, as I saw it first, the specimen had also a few bristles on the other part of the elytra; when I got it the second time the bristles had disappeared, but my friend wrote to me, 'I have cleaned the specimen and brushed it.' I think fresh specimens in good condition will show a few bristles elsewhere and not only on the shoulders." I do not expect *C. sætigera* to show any setæ on the elytra except near the base; perhaps the explanation of the matter may be that some foreign whitish hairs had become attached to the specimen Dr. Horn described, as he first saw it, which were removed by the subsequent cleaning.

Hab.—Yorke's Peninsula, S.A. (Dr. Horn suggests that doubtless his locality, "Cape York," was given to him erroneously for Yorke's Peninsula).

CICINDELA IGNEICOLLIS Bates.

Dr. W. Horn has kindly sent me a sketch of the elytral pattern in *C. igneicollis*, made from the type, which he has examined; by the aid of this sketch I have worked it into the table given above. Bates' description says, "forehead and base of labrum with a dense patch of white laid hairs," and also notes the setæ of the pronotum, base of elytra, and sides of body. It evidently comes nearest *C. sætigera* Horn.

Semicincta-Group.

This group seems to have spread into Australia from Malasia; as represented in Australia it is readily divisible into two subgroups, namely, the *C. semicincta*-subgroup and the *C. mastersi*-subgroup. I believe all the species of the *semicincta*-group have the pronotum with setæ along the sides. These setæ are a conspicuous feature in the *semicincta*-subgroup, but are not always easily seen in the

mastersi-subgroup, though I consider they would always be found in fresh specimens. The elytra in the female have invariably a nitid, or subnitid round dark discal spot on the basal half of each elytron; in *C. semicincta* and *C. mastersi* these nitid spots are very inconspicuous, though their presence can be detected. The species of this group have the labrum normally 3-dentate, the median tooth more strongly developed in the male than in the female; also four widely placed submarginal setæ, except in *C. discreta* var. *froggatti*, which has the lateral setæ as in the other species, but in the middle a transverse row of six setigerous punctures (probably the number of these intermediate punctures is not constant).

Table of Species.

- Head setose beneath eyes. Pronotum subrugose, lateral setæ readily discernible.
- Elytra without whitish discal spots.....*C. semicincta* Brullé.
- Each elytron with a whitish discal spot on posterior half..... } *C. discreta* Schaum,
 } var. *froggatti* MacL.
- Head glabrous, including sides beneath eyes. Pronotum rugose, lateral setæ small and inconspicuous.
- Prothorax subparallel (hardly rounded) on sides. Labrum with a large infuscate apical area; in ♀ with median tooth long, very prominent, the tooth on each side obsolescent.....*C. plebeia* Sl.
- Prothorax rounded on sides. Labrum with edge only infuscate, the tooth on each side of the median one triangular.
- Elytra without lateral pale marks, except a small median fascia. Upper surface of a dark copper colour.....*C. catoptriola* Horn.
- Elytra with lateral pale marks, including a humeral lunule, median fascia, and apical lunule. Upper surface of a greenish or bronzy colour.....*C. mastersi* Cast.

Semicincta-Subgroup.

C. SEMICINCTA Brullé.

Following Fauvel in his "Faune Analytique des Coléoptères de la Nouvelle Calédonie" (1903), I have, in my description of *C. plebeia*, referred to *C. semicincta* Brullé, under the name of *C. interrupta* Fabr. It appears, however, from Fleutiaux's "Catalogue" and Horn's "Index," that the name *C. interrupta*

Fabr., with which *C. semicincta* Brullé, has been confused, must be restricted to an African species from Senegal. *C. semicincta* is remarkable for the long prominent white hairs on the upper side of the fifth joint of the tarsi; these are present, but far less developed, in other species of the group. There are two forms of *C. semicincta* in Australia, namely, one with the elytra greenish (♂, ♀) and with a white marginal stripe from shoulder to apex (fig. 89); the other (I have only the ♀) with two decidedly divided white marginal marks, one apical, the other lateral and extending forward beyond the triangular dilatation that is always found at about one-half the length of the elytra (fig. 88). Mr. F. P. Dodd has sent me both these forms from Kuranda, Queensland; but I have not sufficient material to be able to give any opinion on the value of the differences between the two forms.

Range in Australia.—Sydney to Nickol Bay. It is also found in New Caledonia, New Hebrides, New Guinea, and Java.

C. DISCRETA Schaum, var. FROGGATTI Macl.

C. discreta Schaum, seems to range over the whole of the Malay Archipelago, and to be differentiated into several subspecies or varieties. Dr. W. Horn, to whom I sent specimens (from the collection of the late Sir William Macleay) of *C. froggatti* Macl., identified these as a form of *C. discreta* Schaum, for which he had also proposed a separate name, var. *subfasciata*.* I would index the Australian species as *C. discreta* Schaum, var. *froggatti* Macl. (= var. *subfasciata* Horn).

C. mastersi-Subgroup.

I do not know the extra-Australian affinities of the *mastersi*-subgroup. It is not easy to tabulate the three closely allied species which I recognise as composing this subgroup.

C. plebeia Sl., is differentiated from *C. mastersi* Cast., and *C. catoptriola* Horn, by prothorax less rounded on sides; prosternal episterna blue, almost smooth; elytra of a much blacker

* This variety was described from specimens from Sumatra.

colour, less strongly shagreened and more distinctly punctured; labrum with a large apical infusate patch, median tooth in the female much stronger, &c.

C. mastersi and *C. catoptriola* have the prothorax decidedly rounded on the sides; the prosternal episterna æneous and finely rugulose; labrum with edge only infusate. *C. catoptriola* Horn (= *C. curvicollis* Sl.), may be readily separated from *C. mastersi* by the uniform bronzy colour of the upper surface, the lateral transverse mark of the elytra very small or obsolete, the posterior discal spot very small and inconspicuous, the apical and humeral marginal spots wanting. Dr. W. Horn, to whom I sent specimens of my *C. curvicollis*, has informed me that it is synonymous with his *C. catoptriola*, which he now looks upon as merely a race of *C. mastersi*; to me it looks sufficiently distinct to require a separate name.

Habits.—*Rhysopleura orbicollis* Sl., is found on the mossy trunks of scrub-trees at Kuranda, Queensland. All the species of *Distysidera* are found on the trunks of trees. The *Cicindelæ spurie* are terrestrial in their habits; Mr. Lea found *C. sloanei* Lea, in the sandy bed of a dry creek at Mullewa, inland from Champion Bay. Mr. Hacker found *C. iosceles* Hope, and *C. leai* Sl., beside the railway line near Cooktown; and Mr. Froggatt obtained *C. tenuicollis* Macl., and *C. oblongicollis* Macl., 100 miles inland from King's Sound. *C. nigrina* Macl., and the species of the *tetragramma*- and *ypsilon*-groups frequent sea beaches, as also does, I believe, *C. sætigera* Horn. I have taken *C. mastersi* in different places in New South Wales in open forest country—on the margin of swamps near Urana, and on the margin of Lake Cudgellico, near the Lachlan River; doubtless all the species of the *semicineta*-group have similar habits.

GEOGRAPHICAL DISTRIBUTION.

The publication of Dr. Walther Horn's "Systematischer Index der Cicindeliden" furnishes data for reviewing the geographical distribution of the Cicindelidæ, and has enabled me to offer the

following notes on the distribution of the tribes found on the Australian Continent.

Dr. Horn has catalogued the Cicindelidæ of the globe under 8 tribes, including 38 genera and 1184 species. Of these 8 tribes only one, viz., the Cicindelini, is truly cosmopolitan. The Megacephalini is the next most universally distributed tribe, being found in all the great zoogeographical regions of the earth, though the Palæarctic and Oriental Regions have only one species, while not one has been reported from New Guinea or the East Indian Archipelago. The other tribes have restricted ranges as under—Ctenostomini, Neotropical Region and Madagascar; Collyrini and Theratini, Oriental, but spreading to New Guinea; Neomantichorini, Neotropical and Nearctic; Paleomantichorini and Platychilini, Ethiopian.

Table of Distribution.

REGION.	TRIBES.	GENERA.	SPECIES.*
Palæarctic.....	2	2	68
Nearctic.....	3	4	111
Neotropical ..	4	19	263
Ethiopian.....	5	10	285
Oriental.....	4	7	361
Australian.....	4	11	96

In the enumeration of the tribes, genera, and species given above, the Palæarctic and Oriental Regions receive the benefit of one tribe and genus by the presence of *Megacephala euphratica* Latr., which seems merely a straggler from the Ethiopian Region; while, in regard to the Nearctic Region, probably the tribe Megacephalini (as there represented by four species in the south) is merely an invader from the Neotropical Region. If we divide the globe into two parts, one to include Eur-Asia and all North America north of Mexico and the other the rest of the globe, we find (excluding *Megacephala* from the first division as a southern

* The number of species is approximate; the numbers given total 1184, the number catalogued by Horn; any species that occurs in more than one region has been counted only as belonging to a single region.

invader) only eight genera against thirty genera in the second division, *i.e.*, the southern land areas of the globe; this seems to indicate that the Cicindelidæ are not of northern origin.

From the Australian region, as here intended, the Oriental tribe *Collyrini* might well be excluded; it is represented by *Collyris celebensis* Chaud., in the Aru Islands, and *Tricondyla aptera* Oliv., in New Guinea.* I would go further and also exclude, as Oriental, the Theratini, represented by four species of *Therates*. This would reduce the Cicindelidæ of the Australian region to two tribes, nine genera, and ninety species, but would still leave the Australian Cicindelid fauna, by the variety of its component parts, of greater importance than the Cicindelid faunas of the Oriental, Palæartic, or Nearctic region, though not equal to those of the Ethiopian or Neotropical region.

Turning now to the Australian Continent, we find represented there two tribes and five genera. The species of Australia are, so far as is known at present, endemic, except the widely-spread *C. semicincta* Brullé, and *C. discreta* Schaum, var. *froggatti* Macl.

Tribe Megacephalini.—The distribution of the Megacephalini shows:—South America, five genera and sixty-four species; North America, the genus *Megacephala* with four species; Europe and Asia, *Megacephala euphratica* Latr., only; Africa, the genus *Megacephala* with ten species; Australia, the genus *Megacephala* with seventeen species. The great development of this tribe in the Neotropical region, and its almost complete absence from the Nearctic, Palæartic, and Oriental regions, together with the strong representation of the genus *Megacephala* in the three great southern land-areas of the globe, seem the important points in connection with the distribution of the Megacephalini; and here we see a striking instance of that obscure zoological problem, namely, the relationships which exist in some groups between the faunas of South America, Africa and Australia. My data are not sufficient to enable me to

* *Postscript.*—*Tricondyla aptera* has recently been found at Coen, North Queensland, by Mr. Henry Hacker.—T.G.S., 6-viii.-06.

deal with the distribution of the genus *Megacephala* in Australia; its absence from South-Eastern Australia, and its great development in the tropical parts of the continent are evident and striking points in this connection.

Tribe Cicindelini.—The four genera represented in Australia are *Cicindela*, universal (but not in Tasmania); *Nickerlea* from North Australia; *Distypsidera*, eastern coastal districts northward from the Clarence River (one species has been reported from New Guinea); *Rhysopleura*, an isolated form from the Cairns district of Queensland.

The broad facts of the distribution of the Cicindelidæ in Australia support the importance of Spencer's Torresian and Bassian Subregions; but the Cicindelidæ of the Eyrean Subregion are too little known for any conclusions to be drawn from the distribution of the family in that subregion. The two evident points are (1) their great scarcity in South-Eastern Australia, and complete absence in Tasmania (=the Bassian Subregion of Spencer); (2) their great development in the Torresian Subregion. In that part of South-Eastern Australia which I have named the north and middle Bassian districts* (=the mainland portion of Spencer's Bassian Subregion) only four Cicindelids have yet been found, namely, *C. semicineta* Brullé, and *C. mastersi* Cast., (evidently invaders from the north), with *C. ypsilon* Dej., and *C. albicans* Chaud. The Torresian Subregion, on the other hand, is rich in genera and species, all the genera of the Australian Continent, including thirty-four species, being found therein. It seems that there is some check to the development of Cicindelidæ in Southern Australia, but whether this is (a) some climatic influence, (b) scarcity of food at the proper time of the year for the larvæ, (c) or the presence of some insect or other enemy, I do not know; but it is evident that the southern spread of the Cicindelidæ in Australia is arrested by conditions of an adverse character.

* Cf. Check-list of the Australian Carabidæ, Pt. i. p.3, being Supplement to Proc. Linn. Soc. N. S. Wales, 1905.

EXPLANATION OF PLATES.

Plate xxv.

- Fig.1.—*Megacephala cylindrica* Macl. (♀)
 Fig.2.—*Distypsidera flavipes* Macl. (♀)
 Fig.3.—*Ryssopleura orbicollis* Sl. (type, ♀)
 Fig.4.— „ „ side view.

Plate xxvi.

- Fig.5.—*Megacephala crucigera* Macl.
 Fig.6.—*Cicindela iosceles* Hope (from a Cooktown specimen).
 Fig.7.— „ *doddi* Sl. (type). (♂)
 Fig.8.— „ *sloanei* Lea (type). (♂)

Plate xxvii.

- Fig. 9.—*C. aurita* Sl.
 Fig.10.—*Megacephala australis* Chaud.; side view of larva.
 Fig.11.— „ *cylindrica*; mentum and labial palps.
 Fig.12.— „ *humeralis* Macl.; mentum and labial palps.
 Fig.13.—*Distypsidera undulata* Westw.; „ „ „ „
 Fig.14.—*Cicindela ypsilon* Dej; „ „ „ „
 Fig.15.—*Megacephala cylindrica*; maxilla and palp.
 Fig.16.—*Cicindela ypsilon*; „ „ „

Plate xxviii.

- Fig.17.—*Megacephala cylindrica*; labrum (♀).
 Fig.18.— „ *humeralis*; „ „
 Fig.19.—*Distypsidera undulata*; „ „
 Fig.20.—*Cicindela doddi* Sl; „ „ (♂)
 Fig.21.— „ *sloanei* Lea; „ „ (♂)
 Fig.22.— „ *leai* Sl.; „ „
 Fig.23.— „ *tenuicollis* Macl.; „ „
 Fig.24.— „ *aurita*; „ „ (♂)
 Fig.25.— „ *frenchi* Sl.; „ „ (♀)
 Fig.26.— „ *ypsilon*; „ „ (♀)
 Fig.27.— „ *blackburni* Sl.; „ „ (♀)
 Fig.28.— „ *satigera* Horn; „ „ (♂)
 Fig.29.— „ *discreta* Schaum, var. *froggatti* Macl.; labrum (♂).
 Fig.30.—*Cicindela plebeia* Sl.; labrum (♀).*
 Fig.31.— „ „ „ „ (♂).

* Fig.30 shows the appearance of the labrum in the type specimen(♀). A second specimen in the possession of Mr. C. French has a small tooth on each side of the central one. Fig.31 shows the labrum of the male as too truncate on each side; it should slope forward from the external angles more as shown in fig.30.—T.G.S.

- Fig. 32.—*Cicindela catoptriola* Horn; labrum (♀).
 Fig. 33.— „ „ „ „ (♂).
 Fig. 34.— „ *mastersi* Cast.; „ „ (♂).
 Fig. 35.— „ *sloanei*; apices of elytra.
 Fig. 36.— „ *nigrina* Macl.; apices of elytra.
 Fig. 37.— „ *ypsilon*; „ „ „
 Fig. 38.— „ *semicincta* Brullé; „ „ „
 Fig. 39.—*Megacephala cylindrica*; anterior coxal cavity.
 Fig. 40.— „ „ ; anterior coxa.
 Fig. 41.—*Cicindela ypsilon*; apical ventral segment (♂).
 Fig. 42.—*Megacephala greyana* Sl.; maxillary palp.
 Fig. 43.— „ *humeralis*; „ „
 Fig. 44.— „ *crucigera* Macl.; mandibles and labrum (♀).
 Fig. 45.— „ „ „ „ „ (♂).
 Fig. 46.— „ *cylindrica*; right mandible (♀).
 Fig. 47.— „ *humeralis*; left „
 Fig. 48.— „ „ right „
 Fig. 49.—*Cicindela nigrina*; „ „
 Fig. 50.— „ *ypsilon*; „ „
 Fig. 51.— „ *nigrina*; left elytron viewed from side (♀).
 Fig. 52.—*Megacephala bostocki* Cast.; left elytron viewed from side*(♀).

Plate xxix.

- Fig. 53.—*Megacephala australis* Chaud.; right elytron (pattern).
 Fig. 54.— „ *basalis* Macl.; „ „ „
 Fig. 55.— „ *intermedia* Sl.; „ „ „
 Fig. 56.— „ *bostocki*; „ „ „†
 Fig. 57.— „ *crucigera*; „ „ „
 Fig. 58.— „ *humeralis*; „ „ „
 Fig. 59.—*Distypsidera undulata*; „ „ „
 Fig. 60.— „ „ „ „ „
 Fig. 61.— „ *volitans* Macl.; „ „ „
 Fig. 62.— „ „ „ „ „
 Fig. 63.— „ *flavicans* Chaud. „ „ „
 Fig. 64.— „ *flavipes*; „ „ „
 Fig. 65.— „ „ „ „ „
 Fig. 66.— „ *gruti* Pascoe, var. ? „ „ „
 Fig. 67.— „ „ „ „ „ „

* Figs. 52 and 56 are drawn from the type specimen of *Tetracha excisilatera* Sl.

Fig. 68.—	<i>Distypsidera gruti</i>	Pascoe, var. ? ;	right elytron (pattern).
Fig. 69.—	„	„	„
Fig. 70.—	„	„	„
Fig. 71.—	„	<i>parva</i> Macl.;	„
Fig. 72.—	<i>Cicindela doddi</i> ;		„ (♂).
Fig. 73.—	„	<i>sloanei</i> ;	„ (♂).
Fig. 74.—	„	<i>leai</i> ;	„
Fig. 75.—	„	<i>tenuicollis</i> ;	„
Fig. 76.—	„	<i>nigrina</i> ;	„ (♂).
Fig. 77.—	„	<i>rafflesia</i> Chaud.;	„ (♂).
Fig. 78.—	„	„	„ (♂).
Fig. 79.—	„	<i>frenchi</i>	„ (♀).
Fig. 80.—	„	<i>albicans</i>	„ (♂).
Fig. 81.—	„	„	„ (♀).
Fig. 82.—	„	<i>ypsilon</i> ;	„ (♂).
Fig. 83.—	„	„	„
Fig. 84.—	„	„	„
Fig. 85.—	„	„	„
Fig. 86.—	„	<i>blackburni</i> ;	„ (♀).
Fig. 87.—	„	<i>setigera</i> ;	„ (♂).
Fig. 88.—	„	<i>semicincta</i> ;	„
Fig. 89.—	„	„	„
Fig. 90.—	„	<i>discreta</i> var. <i>froggatti</i> ;	„ (♂).
Fig. 91.—	„	<i>plebeia</i> ;	„ (♀).
Fig. 92.—	„	<i>catoptriola</i> ;	„ (♂).
Fig. 93.—	„	„	„
Fig. 94.—	„	<i>mastersi</i> ;	„

Plate xxx.

Fig. 95.—	<i>Cicindela trivittata</i>	Macl.;	right elytron; from type (♀).
Fig. 96.—	„	<i>albolineata</i> Macl.;	„ „ „ „ (♀).
Fig. 97.—	„	<i>crassicornis</i> Macl.;	„ „ „ „ (♀).
Fig. 98.—	<i>Nickerlea</i> (?) <i>sloanei</i>	Lea;	mentum and labial palps; from type (♂)*
Fig. 99.—	<i>Cicindela iosceles</i>	Hope;	„ „ „ „ †
Fig. 100.—	„	<i>tenuicollis</i> Macl.;	maxilla and palp.

* This sketch was made from the parts without removal from the head, in consequence of which the base of the palps could not be seen very clearly, nor could the hairs thereon be drawn (the hair of the palps is sparse).—A.M.L.

† This sketch having been drawn from the parts *in situ*, the bases of the palps, &c., could not be seen sufficiently clearly to be drawn with absolute accuracy.—A.M.L.

- Fig. 101.—*Cicindela albolineata* Mael.; prothorax; from type (♀).
 Fig. 102.— „ „ *trivittata* Mael.; „ „ „ (♀).
 Fig. 103.— „ „ *iosceles* Hope; labrum (♂).
 Fig. 104.— „ „ „ „ (♀).*
 Fig. 105.— „ „ *tenuicollis* Mael.; labrum showing marginal setæ.
 Fig. 106.— „ „ *crassicornis* Mael.; labrum; from type (♀).
 Fig. 107.— „ „ *tenuicollis* Mael.; labial palp.
 Fig. 108.— „ „ *semicincta* Brullé; anterior coxa, showing tactile seta.
 Fig. 109.— „ „ „ intermediate „ „ „ „
 Fig. 110.— „ „ „ posterior „ „ „ „
 Fig. 111.— „ „ „ anterior trochanter „ „ „ „
 Fig. 112.— „ „ „ intermediate „ „ „ „
 Fig. 113.— „ „ „ posterior „ „ „ „

Plate xxxi.

- Fig. 114.—Larva of *Megacephala australis* Chaud.; in its burrow, viewed from the side.
 Fig. 115.—Larva of *Megacephala australis* Chaud.; viewed from above.
 Fig. 116.— „ „ „ „ „ viewed from below.
 All natural size. From drawings by Mr. H. J. Hillier (see p.326).

CATALOGUE OF THE DESCRIBED CICINDELIDÆ
 OF AUSTRALIA. †

Tribe MEGACEPHALINI.

Genus MEGACEPHALA Latreille, Gen. Crust. et Ins. i. 1806,
 p. 175.

Tetracha Hope, Col. Man. ii. 1838, p. 7.

Pseudotetracha Fleutiaux, Rev. Ent. 1894.

AUSTRALASIÆ Hope, Proc. Ent. Soc. 1841, p. 45; Ann. Nat. Hist.
 1842, ix. p. 425; Thomson, Monogr. p. 49; Fleutiaux, Rev.
 Ent. 1894; Horn, Deutsche Ent. Zeit. 1896, p. 353. *Hab.*—
 Port Essington.

* In my female specimen of *C. iosceles* there is a small tooth, or serration, in the shallow emargination shown in Mr. Lea's figure on the outer side of each deep anterior excision, so that the labrum is 11-dentate (not 9-dentate as in fig. 104); therefore corresponding, in the number of its serrations, with the labrum of *C. crassicornis*, ♀ (fig. 106).—T.G.S.

† This Catalogue is published free from any charge on the funds of the Society.—ED.

- Var. HUMERALIS MacL., (*Tetracha* id.) Trans. Ent. Soc. N. S. Wales, i. p.9, 1863; Fleutiaux, Rev. Ent. 1894; Horn, Deutsche Ent. Zeit. 1896, p.353; Sloane, Proc. Linn. Soc. N. S. Wales, 1906, xxxi. p.325. *Range*—Townsville to Nickol Bay.
- Var. NICKERLI Srnka, (*Tetracha* id.) Deutsche Ent. Zeit. 1895, p.269; Horn, *op. cit.* 1896, p.353. *Hab.*—Cooktown.
- AUSTRALIS Chaudoir, (*Tetracha* id.) Cat. Coll. Cicin. 1865, p 6 ; Sloane, Proc. Linn. Soc. N. S. Wales, 1906, xxxi. p.320.
waterhousei Castelnau, (*Tetracha* id.) Trans. Roy. Soc. Vict. viii. p.32, 1867.
Hab.—Central Australia (Waterhouse), Cooper's Creek (Hillier), North-west Victoria (French).
- BASALIS Macleay, (*Tetracha* id.) Trans. Ent. Soc. N. S. Wales, i. p.lviii, 1866; Fleutiaux, Rev. Ent. 1894; Sloane, Proc. Linn. Soc. N. S. Wales, 1906, p.320.
- Var. PHEOXANTHA Horn, Deutsche Ent. Zeit. 1894, p.110.
Range—Townsville to King's Sound.
- BLACKBURNI Fleutiaux (*Tetracha* id.) Bull. Soc. Ent. Fr. 1895 p.245; Rev. Ent. 1899, p.46; Sloane, Proc. Linn. Soc. N. S. Wales, 1906, xxxi. p.322. *Hab.*—S.W. Australia.
- BOSTOCKI Castelnau, (*Tetracha* id.) Trans. Roy. Soc. Vict. viii. 1867, p.36; Sloane, Proc. Linn. Soc. N. S. Wales, 1906, xxxi. p.324.
? excisilatera Sloane, (*Tetracha* id.) *op. cit.* 1897, xxii. p.34.
Hab.—W.A.: Nickol Bay (*vide* Castelnau)—Northern Territory: Barrow Creek (*vide* French).
- CASTELNAUI Sloane, *op. cit.* 1906; xxxi. p.321. *Hab.*—W.A.: Norseman District (*vide* French).
- CRUCIGERA Macleay, (*Tetracha* id.) Trans. Ent. Soc. N. S. Wales, i. 1863, p.10; Sloane, Proc. Linn. Soc. N. S. Wales, 1906, xxxi. p.320. *Range*—Gayndah to Gulf of Carpentaria.
- CYLINDRICA Macleay, Trans. Ent. Soc. N. S. Wales, i 1863, p.11; Fleutiaux, Rev. Ent. 1894; *op. cit.* 1899, p.46; Sloane, Proc. Linn. Soc. N. S. Wales, 1906, xxxi. p.319. *Hab.*—N.S.W.: Darling River—Q.: Peak Downs, etc.—C.A.: Katherine River (*vide* French).

- FRENCHI Sloane, Proc. Linn. Soc. N. S. Wales (2) viii. 1893, p.25; *op. cit.* 1906 xxxi. p.319; Fleutiaux, Rev. Ent. 1899, p.45. *cylindrica* Chaudoir & Dokhtouroff (not Macleay), Horn, Deutsche Ent. Zeit. 1904, p.94. *howitti* Fleutiaux (not Castelnau), Bull. Ent. Soc. Fr. 1895, p.204; Rev. Ent. 1896, p.285. *Hab.*—Q.: Cloncurry (*vide* French—W.A.: Inland from Roeburn (*vide* French).
- GREYANA Sloane, (*Tetracha* id.) Proc. Linn. Soc. N.S. Wales, 1900, xxv. p.632; *op. cit.* 1906, xxxi. p.319. *Hab.*—W.A.: Carnarvon District (Sharks Bay; *vide* French).
- HELSMI Blackburn, (*Tetracha* id.) Trans. Roy. Soc. S. Aust., 1892, xvi. p.16. *Hab.*—W.A.: Murchison District (Helms).
- HOWITTI Castelnau, Trans. Roy. Soc. Vict. viii. 1867, p.31; Sloane, Proc. Linn. Soc. N. S. Wales (2) viii. 1893, p.483; *op. cit.* 1900, xxv. p.634; *op. cit.* 1906, xxxi. p.319; Fleutiaux, Rev. Ent. 1899, p.46. *Hab.*—Q.: Cooper's Creek (W. A. Howitt)—S.A.: Lake Callabonna (Zietz).
- INTERMEDIA Sloane, Proc. Linn. Soc. N. S. Wales, 1896, xxxi. p.323. *Hab.*—W.A.: King's Sound (Froggatt), Carnot Bay (*vide* French).
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- SCAPULARIS Macleay, (*Tetracha* id.) Trans. Ent. Soc. N. S. Wales, i. 1863, p.10; Fleutiaux, Rev. Ent. 1894; Sloane, Proc. Linn. Soc. N. S. Wales, 1906, xxxi. p.320. *hopei* Castelnau, (*Tetracha* id.) Trans. Roy. Soc. Vict. iii. 1867, p.37; Fleutiaux, Rev. Ent. 1894; Horn, Deutsche Ent. Zeit. 1898, p.194. *Range*—Port Denison to Nickol Bay.
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Tribe CINCINDELINI.

- Genus RHYSOPLEURA Sloane, Proc. Linn. Soc. N. S. Wales, 1906, p.330.
- ORBICOLLIS Sloane, (*Distypsidera* id) Proc. Linn. Soc. N.S.Wales, 1904, xxix. p.529; *op. cit.* 1906, xxxi. p.331. *Hab.*—Q.: Kuranda (Dodd).
- Genus DISTYPSIDERA Westwood, Mag. Zool. Bot. i. 1837, p.251.
- FLAVICANS Chaudoir, Bull. Soc. Imp. Nat. Mosc. i. 1854, p.125; Sloane, Proc. Linn. Soc. N. S. Wales, 1906, xxxi. p.333.
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Hab.—Q.: Cairns.
- GRUTI Pascoe, Ann. Mag. Nat. Hist. (3) 1862, ix. p.462; Horn, Deutsche Ent. Zeit. 1892, p.93; Sloane, Proc. Linn. Soc. N. S. Wales, 1906, xxxi. p.333.
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Hab.—Q.: Lizard Island, Cairns.
- ? MASTERSI Macleay, Trans. Ent. Soc. N. S. Wales, ii. 1871, p.80; Sloane, Proc. Linn. Soc. N. S. Wales, 1906, xxxi. p.333.
Hab.—Gayndah.
- PARVA Macleay, Proc. Linn. Soc. N. S. Wales, (2) ii. 1887, p.215; Sloane, *op. cit.* 1906, xxxi. p.334. *Hab.*—Q.: Cairns.
- UNDULATA Westwood, Mag. Zool. Bot. i. 1837, p.252; Sloane, Proc. Linn. Soc. N. S. Wales, 1906, xxxi. p.333. *Hab.*—Coastal districts of Northern New South Wales and Southern Queensland.
- VOLITANS Macleay, Trans. Ent. Soc. N. S. Wales, i. 1863, p.11; Sloane, Proc. Linn. Soc. N. S. Wales, 1906, xxxi. p.333.

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Hab.—Q.: Port Denison, Townsville.

Genus NICKERLEA Horn, Deutsche Ent. Zeit. 1899, p.135.

DISTYPSIDEROIDES Horn, *l.c.* p.136. *Hab.*—Northern Australia.

SLOANEI Lea, (*Cicindela id.*) Proc. Linn. Soc. N. S. Wales, 1897, xxii. p.584. *Hab.*—W.A.: Mullewa (Lea).

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ALBICANS Chaudoir, Bull. Soc. Imp. Nat. Mosc. 1854, i. p.117.

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Hab.—Eastern Australia (Clarence River, N.S.W., to Fitzroy River, Q.).

ALBOLINEATA Macleay, Proc. Linn. Soc. N. S. Wales, (2) iii. 1888, p.444. *Hab.*—King's Sound.

AURITA Sloane, *op. cit.* 1904, xxix. p.528. *Hab.*—Q.: Cooktown.

BLACKBURNI Sloane, *op. cit.* 1906, xxxi. p.342. *Hab.*—W.A.: Norseman District.

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CATOPTRIOLA Horn, Deutsche Ent. Zeit. 1901, p.355.

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DODDI Sloane, Proc. Linn. Soc. N. S. Wales, 1905, xxx. p.230; *op. cit.* 1906, xxxi. p.338. *Hab.*—Q.: Cairns.

FRENCHI Sloane, *op. cit.* 1904, xxix. p.527; *op. cit.* 1906, xxxi. p.341. *Hab.*—N.W. Australia (Carnot Bay).

- IGNEICOLLIS** Bates, Ent. Mo. Mag. 1874, x. p.262; Sloane, Proc. Linn. Soc. N. S. Wales, 1906, xxxi. p.344. *Hab.*—Nickol Bay.
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Range—Cooktown to Port Essington.
- LEAI** Sloane, Proc. Linn. Soc. N. S. Wales, 1905, xxx., p.234; *op. cit.* 1906, xxxi. p.339. *Hab.*—Q.: Cooktown.
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- NIGRINA** Macleay, Trans. Ent. Soc. N. S. Wales, i. 1864, p.107; Sloane, Proc. Linn. Soc. N. S. Wales, 1906, xxxi. p.339. *Hab.*—Q.: Port Denison (Masters), Townsville (Dodd).
- PLEBEIA** Sloane, *op. cit.* 1905, xxx. p.232. *Hab.*—Q: Kuranda (Dodd).
- OBLONGICOLLIS** Macleay, *op. cit.* (2) iii. 1888, p.445. *Hab.*—N.W. Australia, 100 miles inland from Derby (Froggatt).
- RAFFLESIA** Chaudoir, Bull. Soc. Imp. Nat. Mosc. 1852, i. p.13. *montraveli* Blanchard, Voy. Pôle Sud, iv. 1852, p.8, Pl.i. fig.6. *Hab.*—Cape York; Raffles Bay.
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menetriesi Gistel, Syst. Ins. p.25.
Range—Australia; New Caledonia; New Hebrides; New Guinea; Java.

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Range —Lakes Entrance, Victoria to Sydney (on sea beaches).

 ADDENDA.

The following references were overlooked in their proper places :—

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 p.356, M. FRENCHI Sloane—*op. cit.* 1900, xxv. p.634.